KREONet2/GLORIAD-KR

ONT3 Workshop
September 7, 2006

Minsun Lee
Supercomputing Center, KISTI

GLORIAD-KR KREONet2 KRLight KISTI Korea Institute of Science and Technology Information www.kisti.re.kr

Contents

- KREONET
- GLORIAD-KR/KRLight
- Collaborative Works
- Summary

KISTI Supercomputing Center

1967	1969	1988	1998	2001
Founded as the computer laboratory of KIST	Providing a national computing resource services	Start the first supercomputing resource service in Korea	Merged into ETRI	Currently as KISTI Supercomputing Center
KIST (Korea Institute of Science & Technology)	SERI (Systems Engineering Research Institute)		ETRI (Electronics and Telecommunications Research Institute)	KISTI (Korea Institute of Science and Technology Information)

Six departments

- Supercomputer Operation
- Supercomputing Application
- Supercomputing Research
- Grid Technology Research
- Network Operation
- Network Development

Key Statistics

- Over 100 staffs
- Budget over $ 20 million mostly government funded

Major Missions

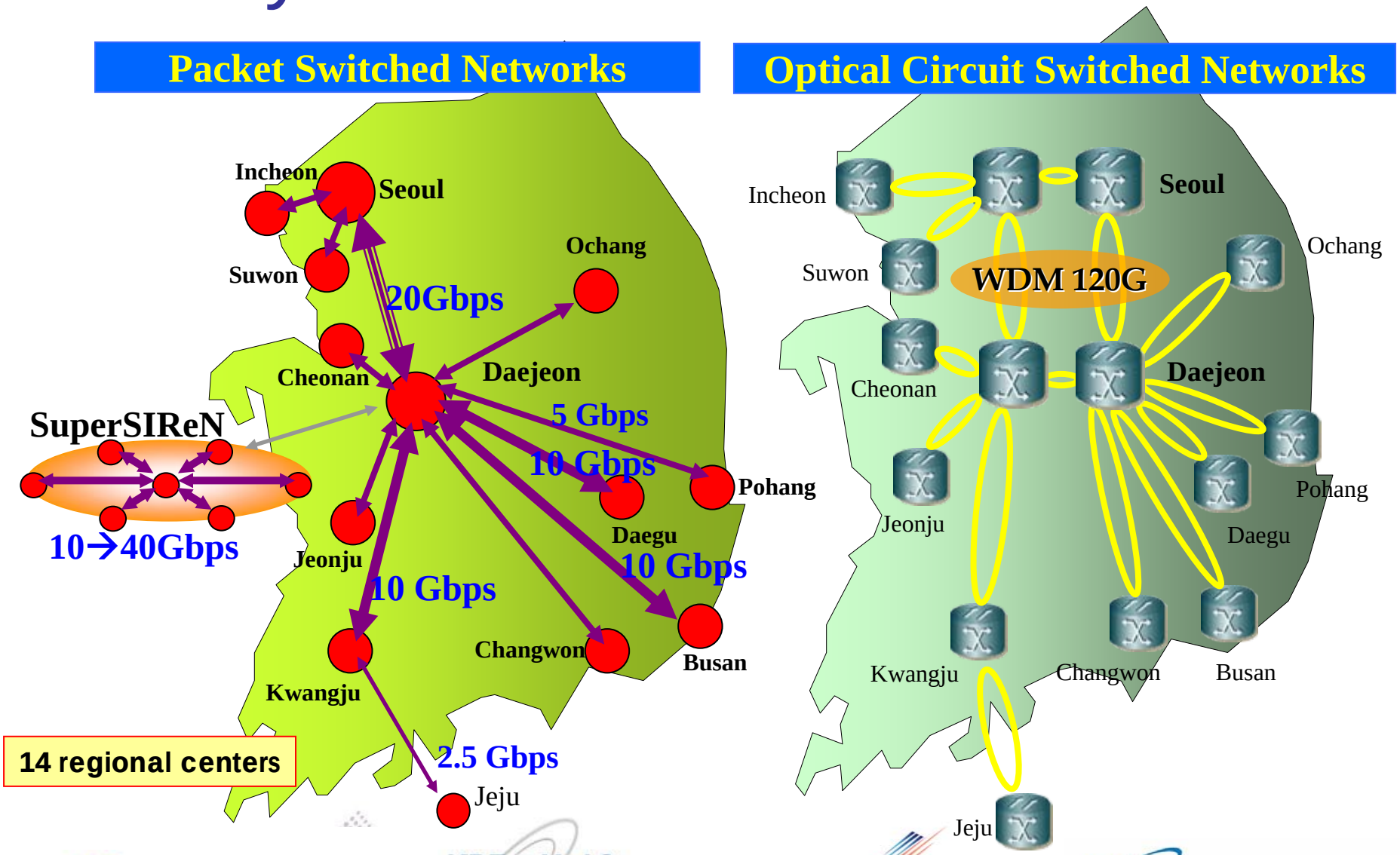
- Supercomputing Service
- Network Service
- National Grid
- National e-Science

KISTI Supercomputing Center is responsible for the national cyberinfrastructure of Korea!

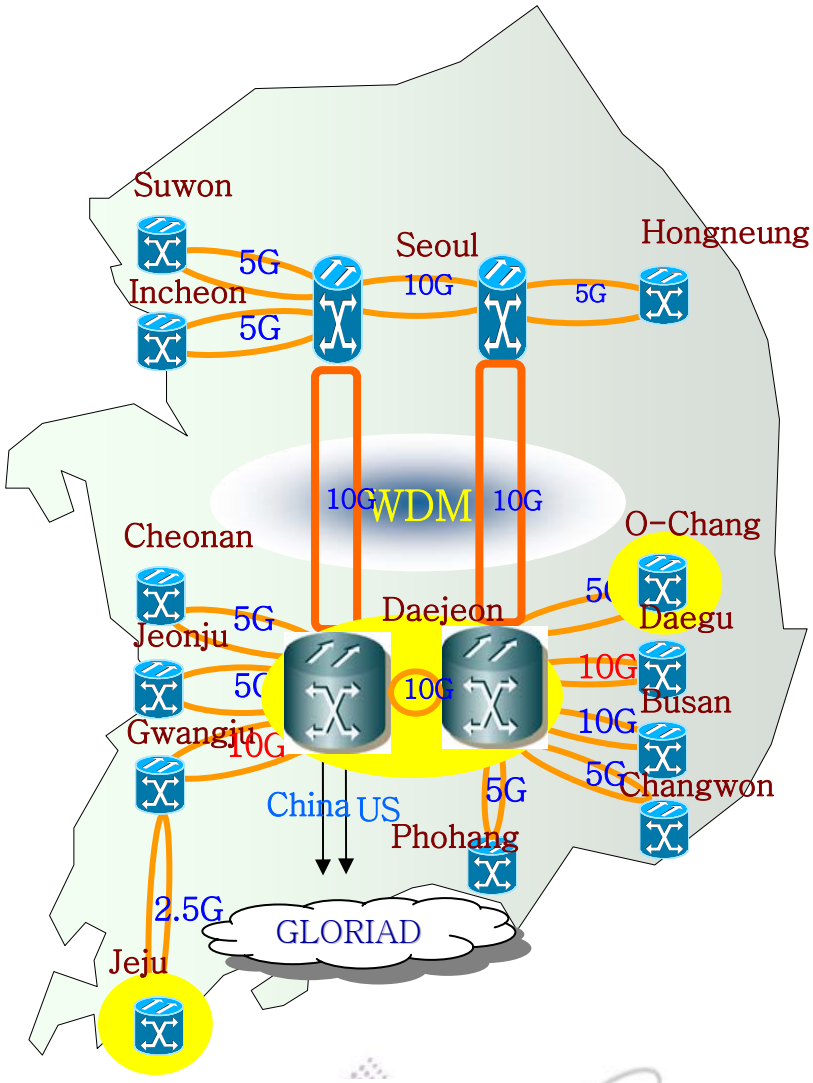
KREONET Overview

- Korea's national science & research network
  - Funded by MOST since 1988
- 20Gbps backbone, 1-10Gbps access networks
- 200 connected organizations/ 100,000 users
- GLORIAD for international connections
  - Two 10Gs : KR to US (Trans-Pacific), KR to CN
- KREONet2
  - Hybrid optical and packet switching facility
  - Dark-fiber (SuperSIReN) and SONET/SDH ring
  - Single/multiple GEs and single 10GE
  - Native IPv4, IPv6 and lightpath provisioning
    - Routed path and lightpath over a single link
    - Mbone
    - IPv6 Gigabit Network

Hybrid Backbone Networks



Network Upgrades



MSPP15454

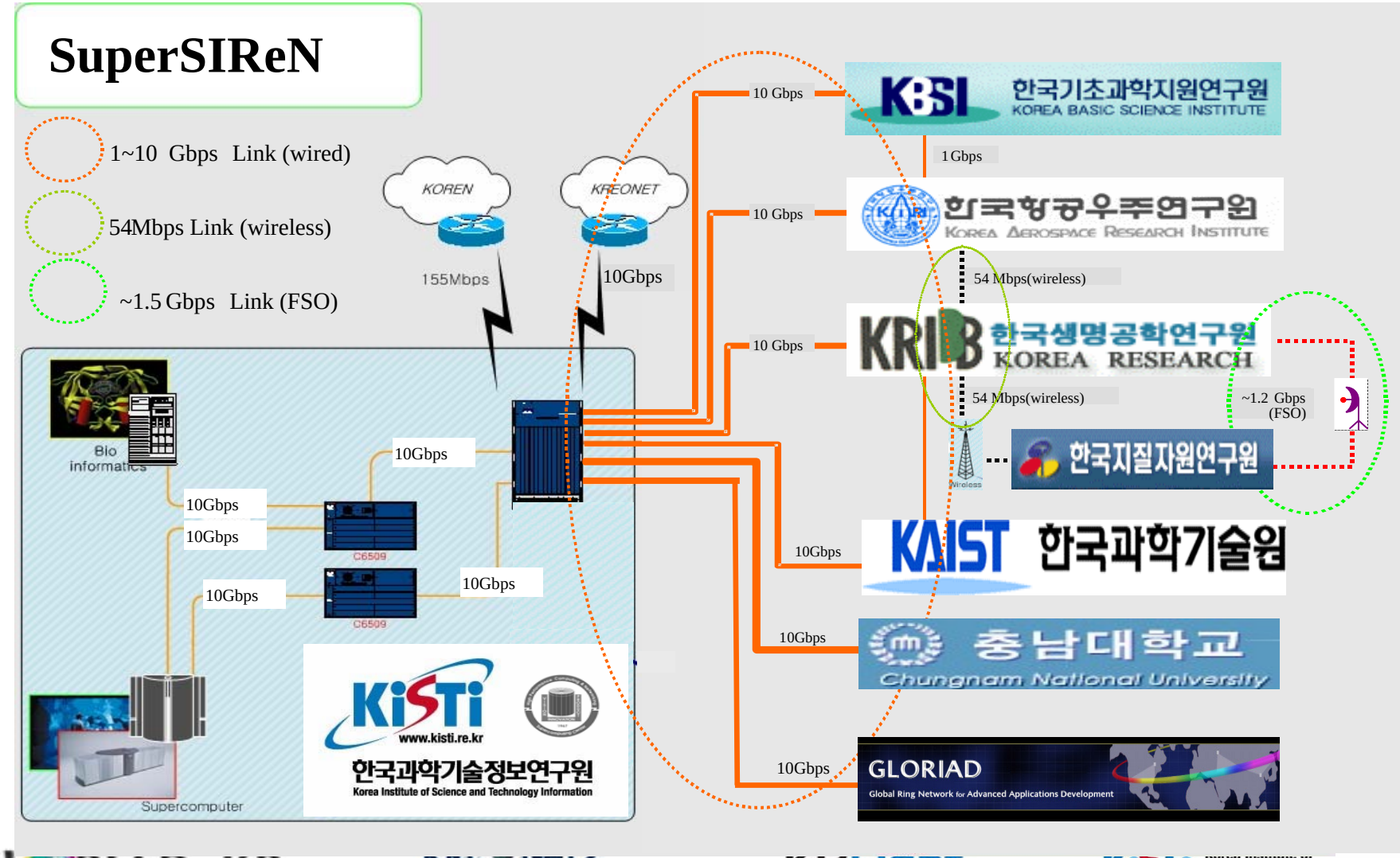
MSPP15600

※ **Every Regional Center is Based on MSPP 15454/15600**

- **New Regional Centers: Jeju and O-Chang**
- **Link Upgrade: Gwangju, Daegu (5Gbps -> 10Gbps)**
- **Equipment Upgrade: Daejeon (ONS15454 -> ONS 15600)**

SuperSIReN

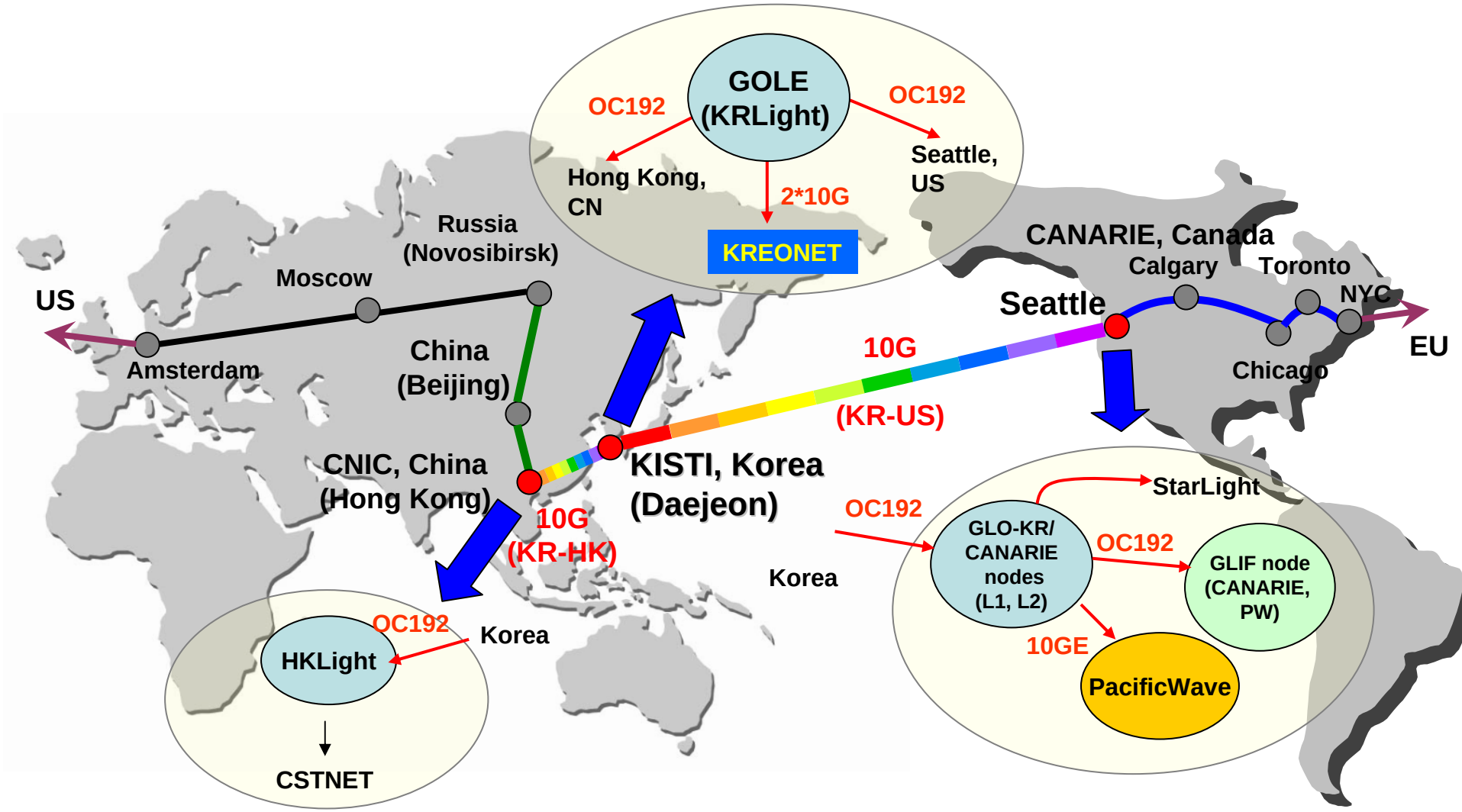
❑ **The first Stage of SuperSIReN : 2002-2004, 7 members, 10Gbps regional testbed**



GLORIAD-KR

- Leading edge for BIG GLORIAD
  - Funded by MOST, Korea
  - Two 10Gs : KR to US (Transpacific), KR to CN(HK)
    - Since Aug. 1st, 2005
  - Multiple 10Gs or 40Gs in the future
- Hybrid optical and packet switching facility
  - SONET/SDH transmission
  - Single/multiple GEs and single 10GE
  - Native IPv4, IPv6 and lightpath provisioning
    - Routed path and lightpath over a single link

GLORIAD-KR 10G Networks I



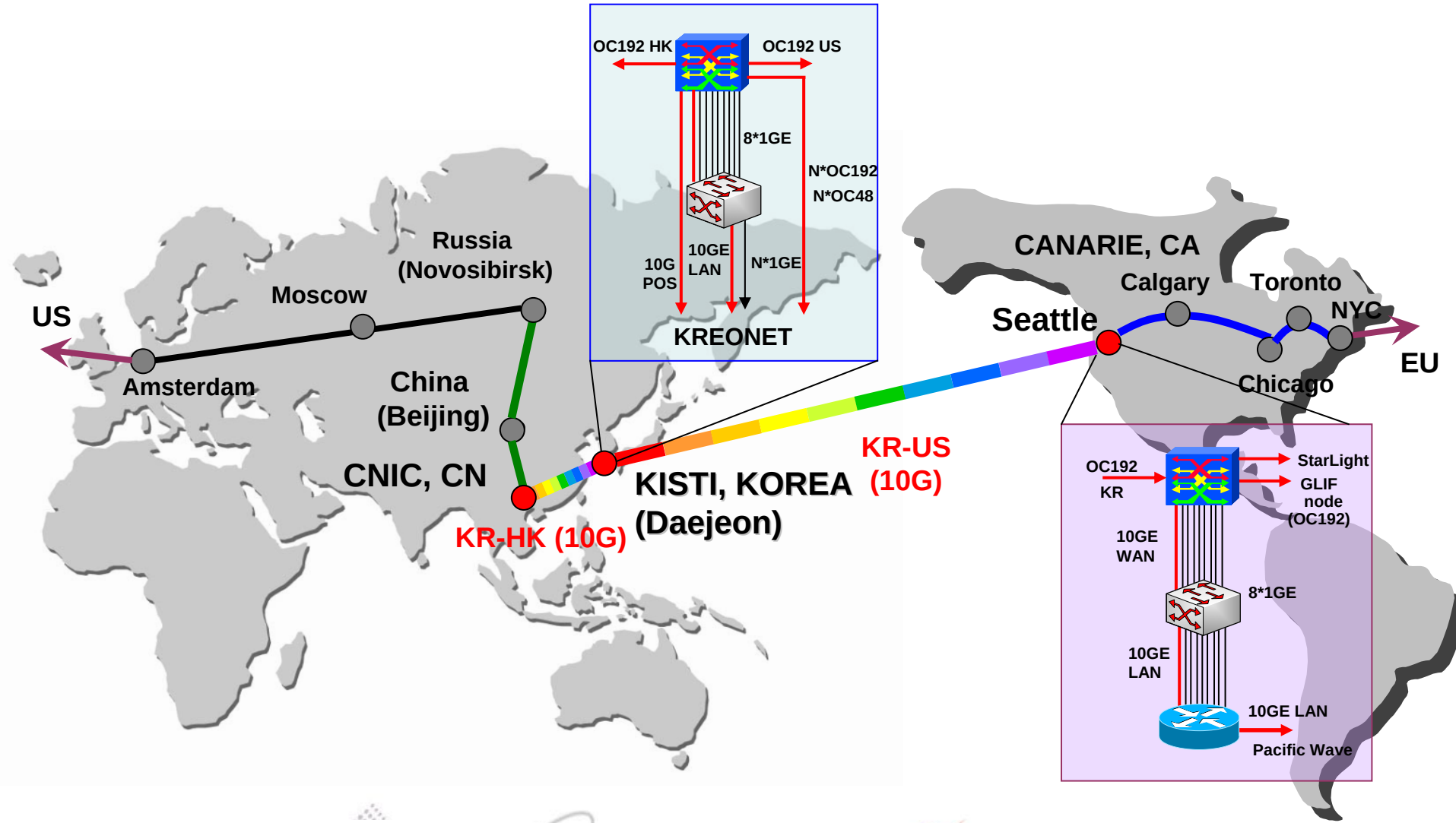
GLORIAD-KR

KREONet2

KRLight

KISTI Korea Institute of Science and Technology Information

GLORIAD-KR 10G Networks II



GLORIAD-KR

KRE Net2

KRLight

KISTI Korea Institute of Science and Technology Information

GLORIAD-KR Hybrid Network

- Part of Big GLORIAD with 10G links
  - China - Korea - US(CA)
  - Hybrid networking architecture (KR-US)
    - 1 x OC192 / 8 x STS24c LP provisioning
    - 1 x 10GE / 8 x 1GE with link aggregation control
    - IP production networking with BGP
  - Performance is good with IPerf (6.3Gbps TCP/ 7.2Gbps UDP)
- UCLP Deployment on GLORIAD-KR: On-Demand Lightpath Provisioning by Application Users and Scientists
  - 1G UCLP demo@APAN in Taipei (Aug. 2005)
  - 10G UCLP demo@iGRID2005 in San Diego (Sep. 2005)
  - 2G UCLP demo@APECTEL in Calgary (Apr. 2006)
- Participation in GLIF Activities
  - 10G LP provisioning thru KR, CA, US, NL for OptIPuter Apps. (Feb. 2006), and more.

Lightpath Diversity

- Basically time-share, partially channel-share
- Single 10GE lightpath, time-share only
  - KR to US : extended to CA, EU
  - KR to CN : Currently HK only
  - Uncompressed HDTV conference, Tier-1 HEP, OptIPuter, etc.
- Single 1GE lightpath, time-share and channel-share
  - KR to US : up to 7 * 1GE lightpath simultaneously
  - KR to CN : up to 7 * 1GE lightpath since 2006
  - Tier-2 HEP, compressed HDTV, SDSS, Medical, etc.
- Multiple GE lightpaths, time-share and channel-share
  - KR to US : up to 7Gbps from 2Gbps
  - KR to CN : up to 7Gbps (HK), up to 2.5Gbps (CN) since 2006
  - Uncompressed HDTV, OptIPuter, etc.

GLORIAD... Why?

- Leverage jointly developed/operated S&E network to expand S&E cooperation between partnering countries
- To support specific S&E applications not supported well by commodity or traditional R&E networks
- To enable communities to build their own specialized networks and for short durations of time
- To provide a test-bed for advanced network research
- To encourage compatible/complementary infrasture development in closer step

Ref: G. Cole

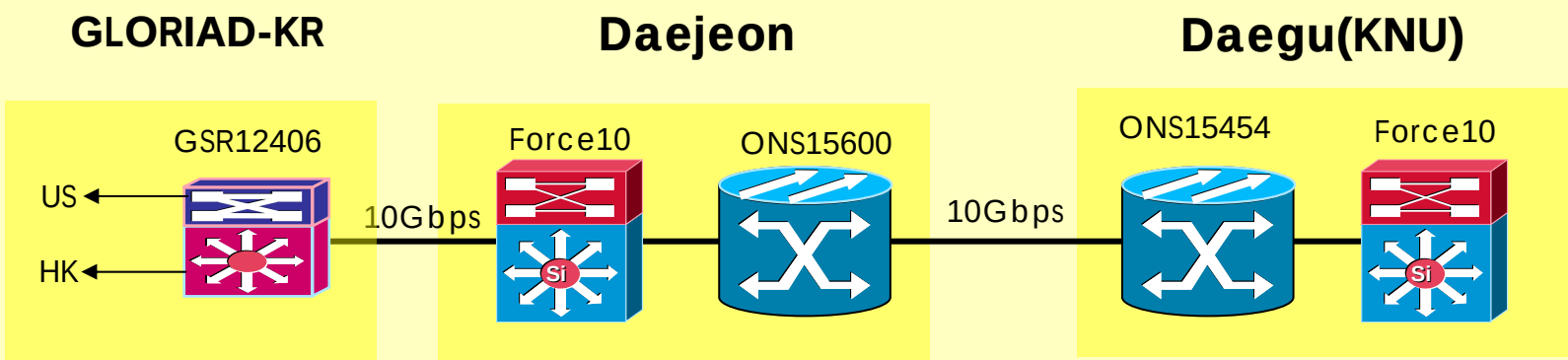
Applications

- Need to move a terabyte of data quickly
- Need quaranteed 1.5Gbps for HD uncompressed video for two hour session
- Need carefullly managed/controlled “jitter” for steering a visualization (such as a “fly-through” application)
- Need a privatedly managed, secure network linking partners distributed around the globe
- Need to tie togeterh large-scale computing resources with dedicated network services

Ref: G. Cole

GLORIAD Access Link Support

※KNU(High Energy Physics lab): dircect 10G Access Link

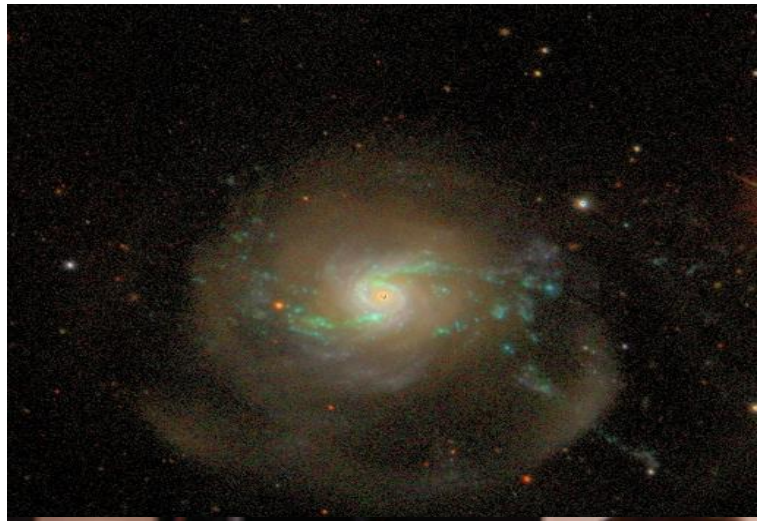


※ We are Supporting about 50 Orgs requires High bandwidth network (Grid computing, HD, Earth Science, HEP etc)

GLORIAD-KR KREONet2 KRLight KISTI Korea Institute of Science and Technology Information

SDSS Demo @ *i*Grid2005

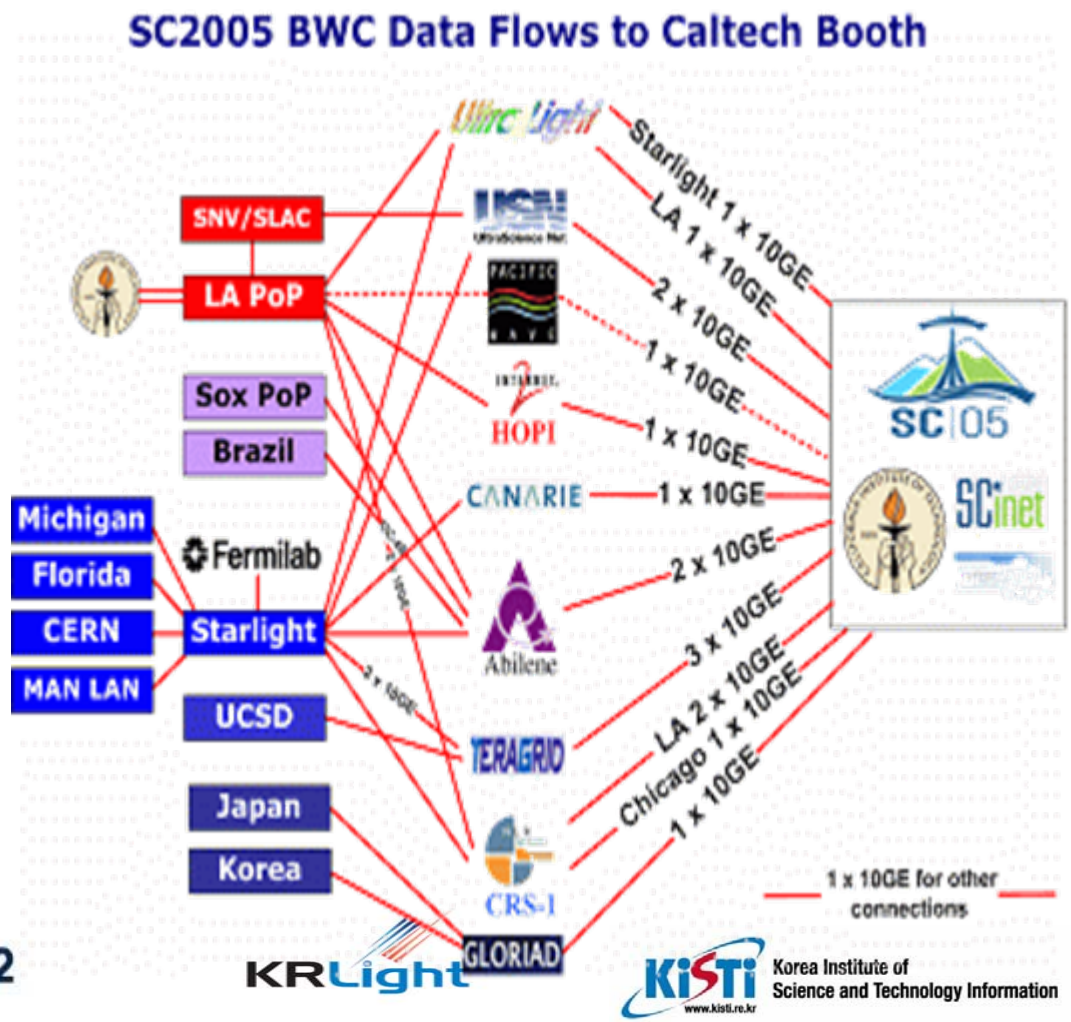
- From Federal Express to Lambdas: Transporting SDSS Data Using UDT(US, Korea, Japan)
- Show how optical paths and new transport protocols are enabling these data sets to be transported using networks over long distances
- Disk-Disk UDT transport from San Diego to KISTI : 1206Mbp/s



GLORIAD-KR

KREONet2

HEP Demo @ SC|05
(also at iGrid2005)



GLO-KR/KRLight & GOLE Collaborations

OptIPuter Demonstration on Feb 22, 2006

Korea, the Netherlands, the US, and Canada participated over 10G Lightpath on GLORIAD

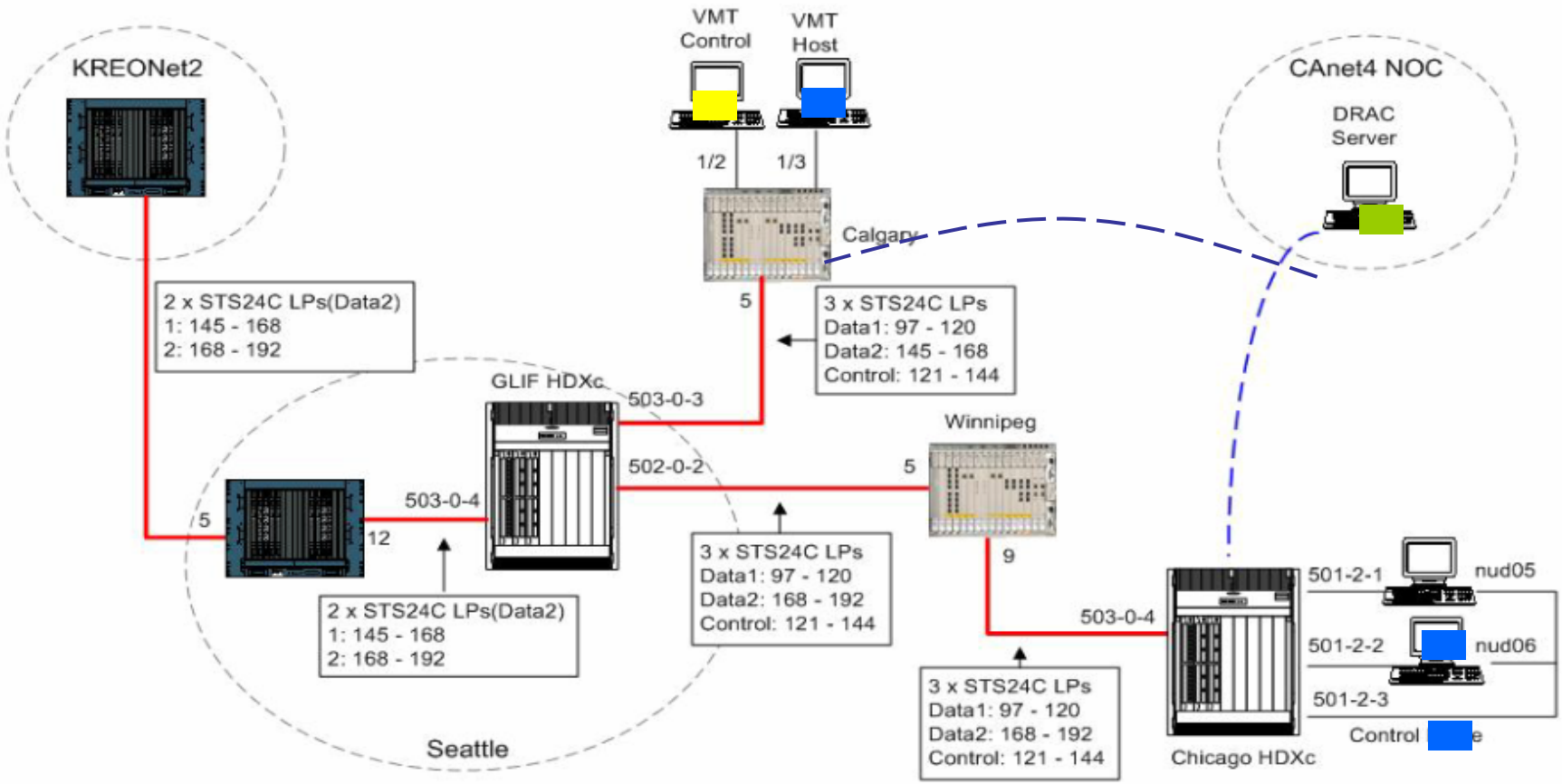
GLORIAD-KR

KREONet2

KRLight

KiSTi Korea Institute of Science and Technology Information
www.kisti.re.kr

APEC TEL Demo with GLO-CA & KR



GLORIAD-KR KRE Net2 KRLight KISTI Korea Institute of Science and Technology Information

Uncompressed internet HDTV

- **Our goals**

→ Develop a low-cost system for uncompressed HDTV services over high-speed IP networks.

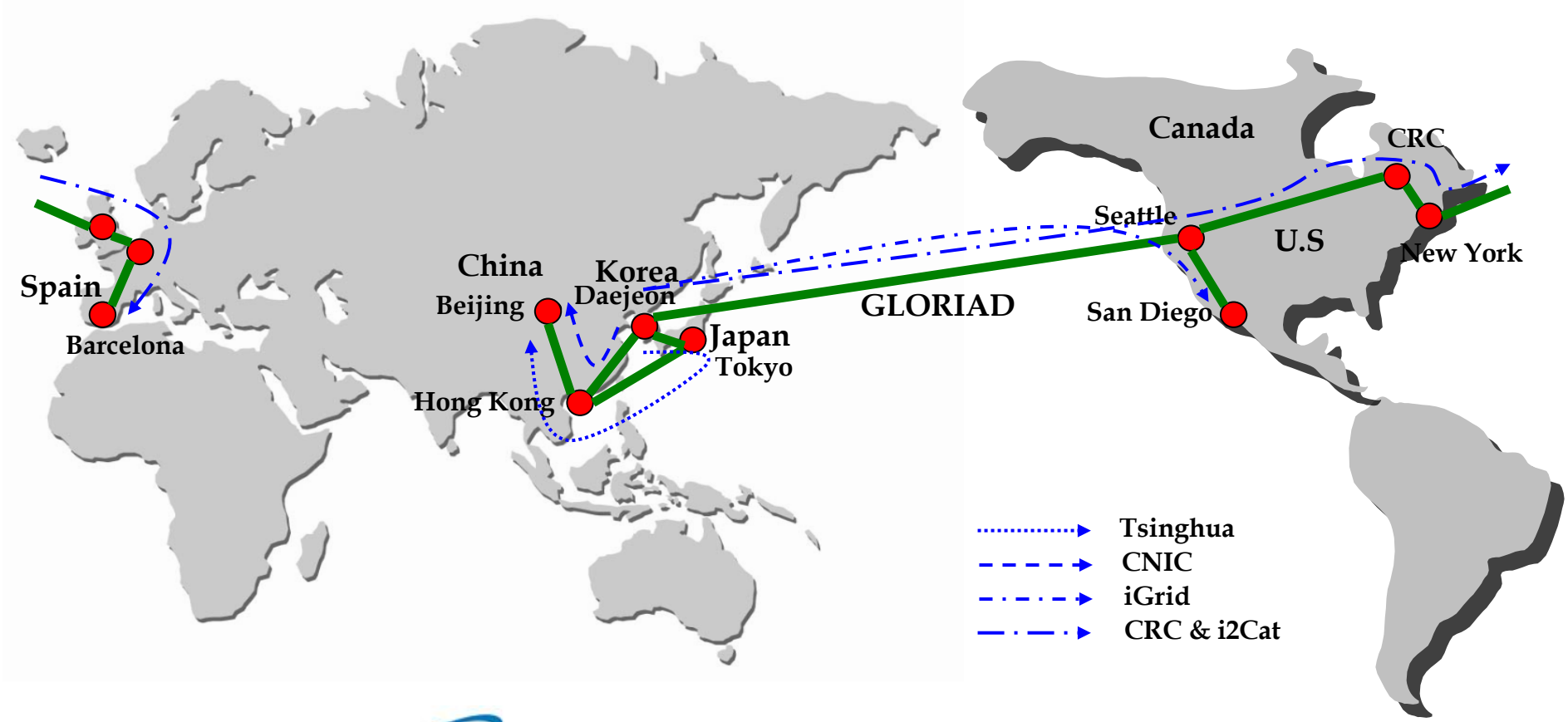
→ Combine uncompressed HDTV services with on-the-edge Lambda technologies (UCLP, virtual routing, and so forth)

→ Provide actual services (culture, seminar, or ETC.) and promote domestic/international collaborations

- **Open-source software** (http://www.gloriad-kr.org/hdtv)

→ UV-0.3.9 (GLORIAD-KR version), which is based on UltraGrid from USC/ISI

Uncompressed HDTV Exp. & Demo.



KISTI www.kisti.re.kr GIST KAIST ANF

CRC i2cat FUNDACIÓ CNIC 中国科学院 计算机网络信息中心 Computer Network Information Center, Chinese Academy of Sciences 清華大學 Tsinghua University ISI Information Sciences Institute

GLORIAD-KR Net2 KRLight KISTI www.kisti.re.kr Korea Institute of Science and Technology Information

Summary

- **KREONET**
  - National Science & Research Network Funded by MOST
  - 20G Hybrid Network Architecture with 200 Users
- **GLORIAD-KR Architecture**
  - Routed Network Facilities for Native IPv4 & IPv6
  - 10G Hybrid Optical & Packet Switching Architecture
- **GLO-KR/KREONet2 and GLORIAD**
  - Cooperative to Expand Global Lightpath Environment
  - Leading Joint Efforts for Advanced Applications
  - VMT Demo with GLORIAD partners are planned during SC06

Thank you!

Please visit http://www.gloriad-kr.org